

What is Claimed is:

1. A game ball having enhanced interlayer adhesion comprising a first layer having a bonding surface, the bonding surface having an adhesion improvement treatment comprising roughening of the bonding surface followed by chlorination of the bonding surface and a second layer having a surface joined to the bonding surface.
2. The game ball as in claim 1, wherein the game ball exhibits an interlayer adhesion strength at least about three times greater than a game ball comprising the bonding surface without the adhesion improvement treatment joined to the second layer.
3. A game ball as in claim 1 comprising a golf ball.
4. A game ball as in claim 1, wherein the adhesion improvement treatment consists essentially of roughening of the bonding surface followed by chlorination of the bonding surface.
5. A game ball as in claim 1, wherein the adhesion improvement treatment consists essentially of roughening of the bonding surface followed by chlorination of the bonding surface followed by post-treatment of the joined first and second layers.
6. A game ball as in claim 1, wherein the adhesion improvement treatment consists essentially of roughening of the bonding surface followed by chlorination of the bonding surface followed by post-treatment of the joined first and second layers, the post-treatment comprising holding the joined first and second layers at a temperature

in the range of about 100 to about 400 °F for a time in the range of about 5 minutes to about 24 hours.

7. The game ball claim 1, wherein one of the first or second layers is a golf ball mantle comprised of a material selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin, polyamide block copolymer and polyester/polyether block copolymer and the other of the first or second layers is a golf ball cover comprised of a material selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin, polyamide block copolymer and polyester/polyether block copolymer.

8. A process for improving adhesion strength between a first surface and a second surface comprising:

roughening the first surface;
chlorinating the first surface; and
joining the second surface to the first surface.

9. The process of claim 8 further comprising the step of heating the first and second surfaces for a predetermined time after the step of joining.

10. The process of claim 8 consisting essentially of the steps recited therein.

11. The process of claim 8, wherein the first surface is comprised of a material selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin, polyamide block copolymer and polyester/polyether block copolymer.

12. The process of claim 8, wherein the first surface is comprised of a material selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin, polyamide block copolymer and polyester/polyether block copolymer and the second surface is a material dissimilar to the first surface material and selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin, polyamide block copolymer and polyester/polyether block copolymer.

13. A treatment for increasing adhesion between joined first and second layers consisting essentially of initially roughening one of the layers, chlorinating the roughened layer, joining the first and second layers and heating the joined layers for a predetermined time, wherein the treatment increases the adhesion strength of the joined layers by at least a factor of about three times over similar untreated first and second layers.

14. The treatment of claim 13, wherein the tensile strength of the joined layers is increased by at least a factor of about seven times over similar untreated first and second layers.

15. The treatment of claim 13, wherein the step of joining comprises molding one of the first or second layers over the other said layer.

16. The treatment of claim 13, wherein one of the first or second layers is a golf ball mantle and the other of the first or second layers is a golf ball cover.

17. The treatment of claim 13, wherein one of the first or second layers is a golf ball mantle comprised of a material selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin, polyamide block copolymer and polyester/polyether block copolymer and the other of the first or second layers is a golf ball cover comprised of a material selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin, polyamide block copolymer and polyester/polyether block copolymer.

18. The treatment of claim 13, wherein both of the first and second layers are roughened.

19. The treatment of claim 13 wherein both of the first and second layers are roughened and chlorinated.

20. The treatment of claim 13, wherein the step of initially roughening one of the layers comprises roughing the layer to a surface finish in the range of about 0.5 μ in to about 2000 μ in.

21. A game ball having enhanced interlayer adhesion comprising a first layer having a bonding surface, the bonding surface having an adhesion improvement treatment comprising treating the bonding surface with a silicone-based adhesion promoter and a second layer having a surface joined to the bonding surface.

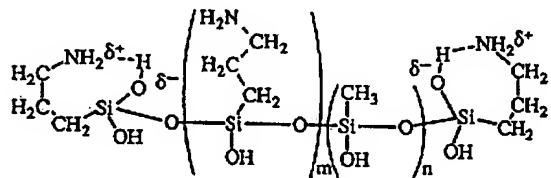
22. A game ball as in claim 21, wherein the game ball is a golf ball.

23. The game ball claim 21, wherein one of the first or second layers is a golf ball mantle comprised of a material selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin,

polyamide block copolymer and polyester/polyether block copolymer and the other of the first or second layers is a golf ball cover comprised of a material selected from at least one of polyurethane, ionomer, terpolymer, metallocene catalyzed polyolefin, polyamide block copolymer and polyester/polyether block copolymer.

24. The game ball of claim 21, wherein the silicone-based adhesion promoter is a silsesquioxane oligomer.

25. The game ball of claim 24, wherein the silsesquioxane oligomer is



where the subscripts m and n are chosen such that the molecular weight of the oligomer is from about 250 to about 650.

26. The game ball of claim 21, wherein the treatment further comprises post treatment of the game ball at an elevated temperature for a predetermined amount of time.

27. The game ball of claim 21, wherein the treatment further comprises at least one of roughening of a bonding surface, plasma treatment of a bonding surface, or chlorination of a bonding surface.

28. A process for improving adhesion strength between a first surface and a second surface comprising:

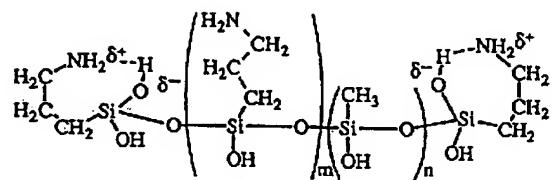
treating the first surface with a silicone-based adhesion promoter;
and

joining the second surface to the first surface.

29. The process of claim 28, further comprising the step of roughening the surface of the first layer prior to treatment with the adhesion promoter.

30. The process of claim 28, wherein the adhesion promoter is a silsesquioxane oligomer.

31. The process of claim 31, wherein the silsesquioxane oligomer is



where the subscripts m and n are chosen such that the molecular weight of the oligomer is from about 250 to about 650.

32. The process of claim 28, further comprising an adhesion promoting technique selected from the group consisting of plasma treatment, corona treatment, flame treatment, interlocking mechanical features, other chemical adhesion promoters, chlorination, ultraviolet treatment, infrared treatment, gamma rays, and e-beam treatment.